DOCUMENT RESUME

ED 387 887 EA 027 081

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TITLE The Effects of Block Scheduling on Seventh Grade Math Students.
PUB DATE Sep 95
NOTE 13p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Academic Achievement; Analysis of Variance; Hypothesis Testing; Intermediate Grades; Junior High Schools; *Mathematics Achievement; *Mathematics Instruction; *School Schedules; Scores; Standardized Tests; *Time Factors (Learning)
IDENTIFIERS *Block Scheduling

ABSTRACT

In an effort to spend time resources more wisely, many schools have turned to block scheduling, in which classes are taught in longer periods. The school year is adjusted by dividing it into 30-; 45-; 60-; or 90-day periods. This paper presents findings of a study that investigated the effects of block scheduling on seventh-grade mathematics students in two Texas middle schools. School 1 followed a traditional 50-minute class schedule and school 2, in its first year of block scheduling, higher achieving students used a 90-minute, alternative-days schedule. Lower achieving students in school 2 attended math class for 90 minutes every day. Methodology included a comparison of the two schools' Texas Assessment of Academic Skills (TAAS) scores for 1994 and 1995. A practice TAAS test was also administered to students during the first semester and again at the year's end. Analysis of variance was used to determine the differences in mean scores. The test scores of lower achieving students who attended math classes more frequently and for longer periods of time were not significantly higher than those of low-achieving students in the traditional 50-minute, daily classes. The study also suggests that uninterrupted class time did not guarantee greater gains in achievement over interrupted time for higher achieving students. Finally, block-scheduling success cannot be adequately measured in 1 year. Other factors of student academic achievement include teacher experience, tests and testing conditions, instructional styles, and school climate. (Contains 15 references.) (LMI)

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ED 387 887

THE EFFECTS OF BLOCK SCHEDULING ON SEVENTH GRADE MATH STUDENTS*

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Public secondary schools are in serious trouble and may be replaced by institutions of choice, both public and private because our education efforts are failing to produce a work force capable of competing with those of other industrialized nations (Carroll, 1994). Educators have responded to the call for improvement by restructuring and rearranging the curriculum, administration, teaching techniques and even the school day. Yet, no matter the solution, there is one consistent recurring problem - finding time to make required changes. Most cures for education's ills involve increased time for training, staff development, collaboration, communication, empowerment or student learning. Education Week identified time as one of seven key areas where change must occur for school reform to succeed (Price, 1993). In the same series on the issue of time, Somerfeld asserted, "We have met the enemy, and they are hours" (Education Week, 1992). In response to the growing concern over time, The 1992 National Education Association Representative Assembly, targeting the issue of time resources as a priority for study, published a list of school improvements that would increase time available to staff and students (Anderson, 1994).

*This research was funded in part by a grant from East Texas State University.

EA 027081

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In an effort to spend the "time budget" more wisely, many schools have turned to block scheduling where classes are taught in much longer periods (90 minutes, 2 hours, or even 4 hours per day). The school year is adjusted by dividing it into 30, 45, 60 or 90 day periods. Canady and Rettig (1993) report the advantages of scheduling classes in longer blocks of time:

- teachers have fewer students to work with daily, lower number of records to keep, a reduced number of courses for which to prepare, and increased planning time.
- students earn more credits each year.
- students have fewer classes resulting in a reduced number of tests and homework on any given day.
- quality instructional time is increased.
- class changes are reduced so schools are less chaotic.
- a greater variety of instructional models are made possible.
- when classes are 30, 45, or 60 days in duration, transient and migrant students are more likely enter a class at its beginning, rather than midstream.

The most popular block schedule plan that is adopted by secondary schools is the AB plan where students attend their first three period classes for 90 minutes every other day (A days) and their 4th, 5th and 6th period classes for 90 minutes on the alternate days (B days). One disadvantage of the AB schedule is that students do not meet with their teachers on a daily basis. This raises a concern for athletic coaches and math teachers who assert that daily drill and practice

are required for mastery of skills, particularly for low achieving students (Chandler, 1994). Madeline Hunter (1987) wrote of the need for massed practice when acquiring a new skill, particularly in the early stages of learning, lending some validity to teachers' concerns.

BLOCK SCHEDULING

There is research to support the belief that students gain by attending classes in longer time segments, but those gains are not always reflected in test scores. Carroll (1994a, 1994b) describes a pilot program where some of the students in a Massachusetts high school volunteered for a school year divided into three trimesters of 60 days each with 100 minute classes. A Harvard University team evaluated the group's progress and made comparisons with the regular student body. The Harvard team found the students in the pilot group a) to be better known by their teachers, and b) to have improved higher-order thinking and problem-solving ability. But test results showed no significant difference between the groups and no difference in retention of material.

Fruman and McKenna (1995) and Watts and Castle (1993) discuss the need for rescheduling the school day and provide a guide for doing so. Although academic gains are expected in the schools being studied, there is, as yet, no specific data to show improvements in student test scores. Time Strategies, (1994) published by the National Education Association, is a comprehensive report on the successful implementation of block scheduling by five schools across the country. Changes reported are numerous, including improved work

day for teachers and students, increased attendance and higher grades, but there is no mention of improved achievement documented by test scores.

One study by Rein, Hierck and Veregin (1994), conducted in Britsh Columbia, more directly addresses the issue of academic gains. When compared to their first year of receiving instruction in large blocks of time, students in their second year showed improved grades, increased numbers of students achieving honor roll status, and decreased failure rates, suggesting that it takes more than one year of implementation of block scheduling for the effects to be felt. When it came to test scores, there were "favorable comparisons to students performance on the standardized final exams in the rest of the province," suggesting that scores were similar but not exceeding those of other schools. The one clear area of improvement was a large increase in college scholarships, based on performance on the British Columbia provincial exams, from six in 1988 to 16 in 1992-1993, the second year of block scheduling. This leaves unanswered the question of exactly when those gains occurred.

While authors of most studies talk of the benefits of block scheduling to teachers and students, it is interesting to note that information on the measure of accountability stressed today, test scores, is conspicuously sparce. The purpose of this research was to make a start, through one small study, by verifying differences in math test scores of seventh grade students in two schools, one on the traditional 50 minute schedule and the other in its first year of block

scheduling. For both schools, the 1994 and 1995 mandated Texas Assessment of Academic Skills (TAAS) test and scores from a pre and post practice TAAS test administered during the first semester and again at the end of the year from the two middle schools provided the data for analysis. Also, the two years' scores from the school that had just completed one year of block scheduling were examined to determine the effects of the change. Two major hypotheses guided the investigation.

> Hypothesis 1: Increased time spent in math class results in increased student achievement when measured by TAAS and TAAS Practice Tests.

All students in School 1 attended math 50 minutes a day. The lower achieving students in the block scheduled school, School 2, received 90 minutes a day of math instruction, twice as much time as the lower achieving students in School 1. In other words, the lower achieving students in School 2 were double-blocked so that, out of six periods, two were in math classes, one falling on A days and one on B days. The expectation was that moving to a 90 minute block schedule for all students and double-blocking lower achieving students for math would increase student achievement more than the traditional 50 minute period day.

> Hypothesis 2. Uninterrupted time spent in classes (90 minute class periods) more positively effects student achievement in math than does interrupted time (50 minutes periods) when measured by TAAS and TAAS Practice Tests.

Higher achieving students in School 2 received 90 minutes of instruction every other day while those in School 1 received 50 minutes daily. Thus, over two weeks, the students in School 1 received 500 minutes of instruction and 450 in School 2 but the students in School 2 had longer class time with fewer interruptions. Because School 2 was in its first year of block scheduling so differences in test scores from one year to another provided further verification of the hypothesis.

METHOD

This article is based on comparisons within and between test scores of two Texas middle schools. School 1 had 296 students in seventh grade, 49% of whom were on a free or reduced lunch program. School 2 had 395 seventh graders with 46% on free or reduced lunch. Individual seventh grade student's math scores from the TAAS, taken yearly by all Texas students, were used for comparison. As a second measure of achievement, a TAAS practice test developed by Region VIII Education Service Center, was administered late in the first semester and again at the end of the year. This test was given by teachers in their classes under conditions less stressful than those of the TAAS, where graduation is ultimately tied to test results. On the other hand, the TAAS Practice Test was timed (60 minutes), while the TAAS was not. Students were identified as being higher or lower achieving according to national achievement test scores and by teacher recommendation and were scheduled into classes accordingly.

For both hypotheses an analysis of variance was used to determine the differences in mean scores. For hypothesis 1, lower achieving students' scores in both schools were examined; for hypothesis 2, scores from higher achieving students' in the two schools were analyzed.

RESULTS AND DISCUSSION

Results

Hypothesis 1 stated that the increased time spent in math class would increase student achievement as shown by gains in the Texas Assessment of Academic Skills (TAAS) and the TAAS Practice Test. School 1 scheduled students into 50 minutes a day, while School 2 scheduled lower achieving students into a full 90 minutes a day. An analysis of the 1994 and 1995 TAAS scores showed that, while the lower achieving students in both schools did make gains from one year to another, neither made significantly more gains than the other. The mean of the 1994 scores for School 1 was 62, and 61 for School 2, while at the end of 1995 the means were 65 and 63, respectively.

The TAAS pre and post Practice Test, on the other hand, did show significant differences between the two schools. School 1 had a mean of 27 on the pre-test and 36 on the post. School 2 began with a similar mean of 28 on the pre-test but gained less over the year, ending with a mean of 32.

Hypothesis 2 states that uniterrupted time spent in math classes more positively effects student achievement in math than does

interrupted time. To test this hypothesis, the scores from the 1994 and 1995 TAAS and the pre and post TAAS Practice Test of the higher achieving students in both schools were analyzed. Students in School 1 spent 50 minutes a day in math while those in School 2 spent 90 every other day.

TAAS scores from 1994 and 1995 showed no significant differences between the two schools. The mean for the higher achieving students in School 1 was 83 in 1994 and 82 in 1995; School 2's remained virtually unchanged, with 85 in 1994 and 84.5 in 1995.change with a mean of 85 for both years. The analysis of the pre and post TAAS Practice Test, on the other hand, showed that although both groups had a mean of 39 on the Pre-test, School 1 made more gained more with a Post-test mean of 53 to School 2's mean of 45. For School 2, one year of block scheduling did not result in large gains in TAAS scores. The means of the higher achieving students showed virtually no gains, while the lower achieving students only increased by two points, from 61 to 63 on a hundred point scale.

Conclusions

Previous research has shown advantages to teachers and students when class periods are of longer duration, allowing students uninterrupted time in which to learn. Documentation of improved student achievement as shown by gains in student test scores is sparce. There is no documentation showing that the combination of increasing the time spent in math and lengthening the class period (90 minutes daily) significantly increases test scores.

This study indicates that when lower achieving students attend math class more frequently and are there for longer periods at a time (90 vs. 50 minutes) test scores do not necessarily increase more than scores of students in the traditional daily 50 minute classes. The study also suggests that uninterrupted time spent in class does not guarantee greater gains in achievement over interrupted time. Finally, this study indicates that one year of block scheduling is not a clear measure of success and that more investigation, for example over three to five years, is needed. Clearly, there were other factors that impacted the results of this study.

First, teachers are still an important ingredient when it comes to achievement. The three seventh grade math teachers in School 1 had 2, 4 and 24 years of experience. In School 2, of the three teachers who taught the majority of the students, two were first year teachers and the third had 6 years of experience. Two other teachers picked up 45 students; one was a first year teacher and the other had 20 years of experience. Thus, the school with 50 minute classes had math teachers with an average of 10 years' experience while those in the block scheduled school had 5.4 years, with three of the teachers in their first year of teaching.

Second, the study by Rein, Hierck and Veregin in British Columbia examined gains in achievement during the <u>second</u> year block scheduling was implemented. It will be important for School 2 to continue to monitor its achievement over the next few years as

improvement may not manifest itself until the change is of longer duration.

Third, tests and testing conditions make a difference. There was considerable difference in the findings between the TAAS scores and the TAAS Practice Test. One is a state adopted measure of accountability, a test that has been scrutinized by experts from across the country and is administered under strict guidelines, with no time limit. The Practice Test, on the other hand, was modeled after the TAAS, had a time limit of 60 minutes, and was administered more informally than the state test. The question is, which test truly tells the story.

There were other, important factors that limit the conclusions, such as differences in teachers' training and instructional style. For example, did the teachers in School 2 change their instructional methods given the longer class periods? This remains unanswered. Nevertheless, this is a start. Before schools make a tremendous restructuring leap, it is important to know what advantages can realistically be gained and what may impede progress toward the goal. Expecting improvements in the daily lives of students and teachers is fine, but expecting great gains in test scores, a measure becoming increasingly important in many states, is another issue.

For academic improvement, there are many other factors that years of research have proven to be helpful and these must be considered along with changes in time in class. Teacher enthusiasm, strength of

the leadership, school climate and parent involvement are certainly among these (Sergiovanni, 1994). If schools are to be involved in restructuring of any sort, assessment of the effects of those changes must be built into the plans.

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